
# Existing Conditions and Facility Evaluations - Warren

POWDER MILL FISH HATCHERY FEASIBILITY STUDY

New Hampshire Fish and Game Department

May 25, 2023

# Contents

## Tables



## Figures

*This page is intentionally left blank.*

# 1 Introduction

Warren Special Purpose Facility (Warren) is located about one mile to the south of the Town of Warren along New Hampshire (NH) Route 25/118 in Grafton County, NH. The ground on which the Warren facility lies was purchased by the State of New Hampshire in 1915. The site was chosen due to its proximity to the Boston and Maine railroads at the time and the free-flowing spring that produced 300 gpm. Construction began at the site in 1918, which makes the facility the oldest state hatchery open in the New Hampshire system.

**Warren at a Glance**

- Constructed in 1918
- Source Water free-flowing springs
- Receives fingerlings from New Hampton
- Produces 166,695 fish (23,685 lbs) annually
- Stocks out fish in northwestern portions of the state

Due to changing production needs within the NH system, Warren was closed in 1984 and leased to private growers. As state production needs continued to change again, the facility was reopened by the state in 1992 and has been in state operation since. It was originally reopened as a visitor center special purpose facility. Later it became a trout and Atlantic salmon (ATS) hatchery for the NHFGD system, but the federal ATS program ended with hurricane Irene in 2005.

Now, Warren produces 60,000 fish annually consisting of 2-year-old Brook trout and yearling Brook, Brown and Rainbow trout. The facility is situated on a 133.95-acre site of which 13.63-acres have been developed. The facility consists of groundwater and surface water supplies; thirteen (13) earthen ponds; three (3) show ponds; a hatchery building with five (5) concrete raceways and eighty (80) vertical flow through tray egg incubators and visitor's center. The hatchery produces over 25,000 pounds of fish annually that are stocked in public waters throughout the state. Also, the Public Relations (PR) Pond or former ATS brood pond is now being used for threatened Bridle Shiners.

The existing site plan (Figure 1-1) illustrates the hatchery boundary, approximate topographical information, and general hatchery infrastructure. The study drawing was developed using digitized (i.e., traced) Computer Aided Drafting (CAD) techniques and map overlay technology. The drawing is believed to be a reasonable, to-scale representation of hatchery resources for planning purposes and has been updated where necessary to reflect conditions as of 2022. The drawing is not intended to be used for construction phase engineering. A flow diagram of the facility is shown in Figure 1-2.

NPDES has authorized Warren State Fish Hatchery to discharge its effluent through Outfall Number 001 into Patch Brook (shown in Figure 1-3). In 2021 the Region 1 Final Aquaculture General Permit (AQUAGP) was released (NGH130000), which superseded Warren's individual permit issued in 2011 (NH0000736).

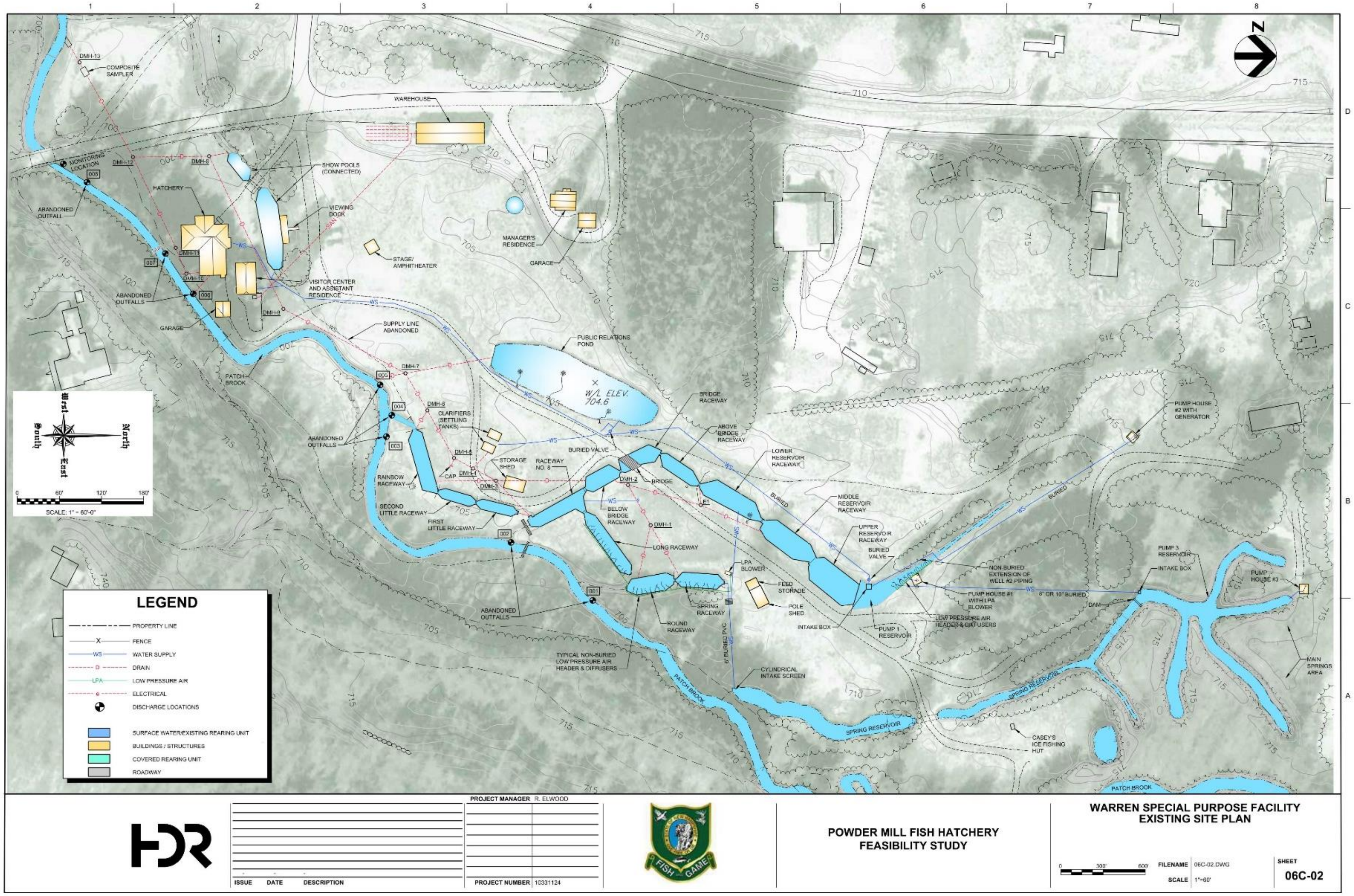
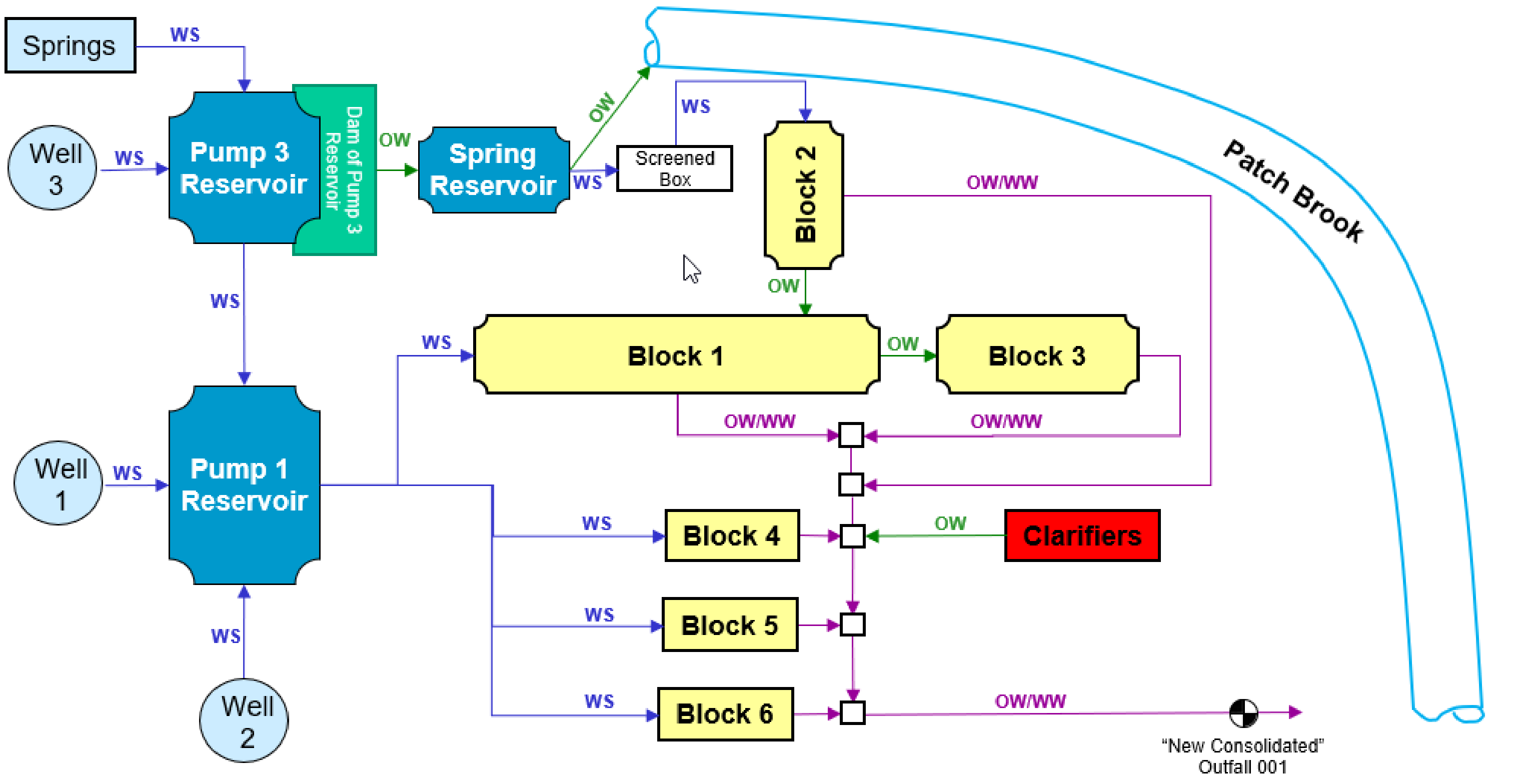



**Figure 1-1: Existing Warren Site Plan**

## WARREN HATCHERY

***Generalized Water Flow Diagram Showing the Major Rearing/Treatment Units***




**Block 1 = Reservoir, Bridge, & No. 8 Ponds**
**Block 2 = Spring, Round, & Long Ponds**
**Block 3 = First Little, Second Little, & Rainbow Ponds**
**Block 4 = Former Public Relations Pond**
**Block 5 = Show Pools**
**Block 6 = Hatchery Building**

**ws = water supply**
**ww = wastewater**
**ow = overflow**
**ow/ww = combined**
**- - = optional route**
**= discharge location**
**= monitoring location**

**Figure 1-2: Warren Process Flow Diagram**

**Figure 1-3: Outfall No. 1**

A condition assessment field visit was performed by HDR on May 4, 2022. The team of engineers included process, mechanical, structural, electrical, and architectural disciplines. The goal of the condition assessment was to understand the remaining useful life of the existing facilities, understand deficiencies inherent in the existing design, and develop an understanding of whether existing facilities that are in poor condition can be rehabilitated or require complete replacement. The sections below review the conditions of the hatchery as witnessed on-site as well as through discussions with hatchery staff.

# 2 Best Management Practices

In 2010 all the campus's process drains were consolidated with a network of manholes and buried polyvinyl chloride (PVC) pipe beginning as 12-inch diameter. Now there is one outfall instead of several. The drain consolidation project included the addition of two rectangular clarifiers in the middle of campus. During the majority of the year, hatchery staff vacuum solids using a trailer mounted tank and land apply them. In winter when vacuumed solids cannot be land applied, they are dumped into either clarifier. Three to six 600-gallon loads are dumped into each clarifier every 2-4 weeks during winter. Each clarifier has an overflow weir leading to an 8-inch PVC drain to the consolidated drain system. Each clarifier also has a 3-inch decant hose and 1-1/2-inch PVC ball-valved spring water supply pipe. The clarifiers are precast concrete and enclosed in chain link fence.

# 3 General Site Conditions

The site is relatively compact and follows Patch Brook with water supply facilities at the northern end, raceways/ponds in the middle, and the buildings and show ponds at the southern end. Access to the site is off Fish Hatchery Road, which is a local access road parallel to NH 25/118. The site is generally flat with an overall slope of about one percent from north to south.

## 3.1 Predator Control System

Predation control consists of metal-framed open structures covered with netting over the Bridge Pond, Lower Reservoir Pond and Middle Reservoir Pond, Below Bridge Pond, Pond No. 8, Spring Pond, Round Pond and Long Pond. The draped netting is generally held in place with stakes. Netting is used on the exterior rearing units to deter bird predation. Trapping also reduces mammalian predation. The magnitude of fish losses due to predation is not known.

## 3.2 Holding Ponds for Disease Treatment

The facility currently has no method to contain water that has been treated with antibiotics or other disease treatments.

## 3.3 Roads and Parking

The roadways and parking areas at Warren are gravel and generally in fair condition. The front parking lot and visitor center area are also gravel topped.

## 3.4 Fencing and Security

Chain link fencing extends along the front of the facility along Fish Hatchery Road. The extent of fencing is shown Figure 1-1. Utility-owned lighting is used to illuminate the facility during non-working hours. Staff have reported that vandalism is not a problem at this site.

## 3.5 Site Drainage and Flooding

According to the Flood Insurance Rate Map (FIRM) from the National Flood Insurance Program (Map Number 33009C0592E, effective February 20, 2008) the facility is within a floodplain zone. The hatchery location has been designated Zone X which are areas between the limits of the 100-year and 500-year flood; or certain areas subject to 100-year flooding with average depths of water less than one foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood.

The brook behind the hatchery building backs up for one to two days every spring. Water has backed up into the hatchery building a few times in the past. Site drainage is poor throughout the facility during wet periods.

## 3.6 Domestic Water/Wastewater Systems

The domestic water supply for the visitor center and apartment is the main water supply spring reservoir, which also feeds the hatchery building. Domestic and potable water are supplied to the residence by an on-site, private well. The domestic wastewater is treated on-site via a conventional gravity septic system and leaching field. The residential system was installed in 1994.

## 3.7 Electrical

Electricity is provided by the New Hampshire Electric Co-op. Power is provided at 240/120V, single-phase, and 208V 3-phase from the overhead distribution line along Mt. Moosilauke Highway (NH 25/118). Electricity is considered moderately reliable. Personnel report that power outages occur approximately twelve times per year and last six hours or less. The longest reported power outage was 1 day.

There are four utility service points to hatchery facilities: 1) a 240/120V, single-phase service to the Hatchery Building, Visitor's Center, and Garage; 2) a 208/120V, 3-phase service to Well #1, Well #2, and Well #3; 3) a 240/120V, single-phase service to the warehouse building, and 4) a 120V service for aerators at raceways/ponds. Utility service comes in overhead, and all distribution between facilities is underground.

Backup power is provided by two emergency propane generators: 25 kW (2020) and 12 kW (2001). The first unit is located at Well House #2 and is used for the three well pumps. The second unit is located at the Hatchery Building and is used for the UV system, filtration system, hatchery building lights, and furnace. Both generators have auto start and auto transfer switch capabilities. The generators are loaded to capacity. The units are exercised once per week. It is recommended that the need for additional backup power be evaluated further after required modernization improvements have been determined.

The alarm system (Diverse Monitoring Company) alerts hatchery personnel to pump failure, low transmittance, filter problems, and general power failure. The hatchery staff is notified by a phone dialer that calls employee residences and pagers. The alarm system provides no control of instrumentation systems.

There is minimal site lighting at the facility. Site lighting is desired by hatchery staff to facilitate safe operational tasks at night.

## 3.8 Other Utilities

Propane fuel and heating oil are used at the facility for vehicles, emergency generators and for heating. Both fuels are stored in aboveground storage tanks (ASTs). Specific information regarding the ASTs is unknown. The site has phone and internet connectivity.

## 3.9 Public Visitation Information & Education Services

Facility personnel estimate that 30,000 people visit the facility annually. Visitor's amenities include a visitor's center, display area and viewing station at the Hatchery Building, public restrooms (ADA compliant), show pond with accessible viewing platform (Figure 3-1), public parking (including dedicated accessible parking), pavilion, and picnic tables (Figure 3-2). The Visitor's Center is currently closed due to fire separation issues between the Visitor's Center area and the residence / office above it. See Section 6.5 for more information on the Visitor's Center. The visitor's area in the Hatch House has also currently closed, due to the fact that the area has no accessible path from the parking areas to the entrance. See section 5.1 below for more information on the visitor's area and viewing station within the Hatch House. The public restrooms and other outdoor public facilities are currently open to the public.

The public bathrooms are mostly ADA compliant, other than the following:

- Men's: The door latch side is only 10" from the wall, where ADA calls for 12" clear on the latch side.
- Men's and Women's: The mirrors are not ADA compliant mirrors.

Otherwise, the public bathrooms were in good to fair condition. Although both rooms showed visible rusting on the bottom of the doors, and on the radiators, which is likely due to frequent flooding in this area.

As most of the roads are dirt, there are very few accessible paths connecting the various public amenities. The fact that there is no path to the entrance to the visitor's area in the Hatch House, and the public must walk through the grass to get to the entrance, is the reason that space is currently closed.

The hatchery staff had developed a self-guided nature trail for the public to utilize with informational stopping points, however, this has not been maintained, and the trail is hard to follow, and at least one bridge across the creek was missing at the time of the site visit.

**Figure 3-1: Show Pond, Accessible Viewing Area and Accessible Parking Space**

**Figure 3-2: Public Parking, Picnic Tables, and Pavilion**

# 4 Water Supply and Control Structures

Production water for Warren is provided by springs and three wells which together yield between 200 and 350 gallons per minute (gpm). The source water is stored in three reservoirs prior to use in the rearing units. Well #1 produces between 90-100 gpm of flow and Well #2 produces approximately 150 gpm flow. Wells 1 and 2 fill Pump 1 Reservoir. Well #3 produces approximately 500 gpm flow and, along with several natural springs, fills Pump 3 Reservoir.

Water flow measurement for the site has been obtained using the sharp crested weir method or direct measurement using a known volume container and time required for filling. There are no water flow meters except at the outfall.

## 4.1 Well #1

Well #1 is housed next to Pump 1 Reservoir and fills the reservoir, see Figure 4-1. The pump is a 5 horsepower (hp) end-suction centrifugal pump that must be manually primed. Its nameplate says Rice Pump & Machine Co. When they are searched on the internet, results include vintagemachinery.org and the National Museum of American History (Smithsonian). A new pump is justifiable. Self-priming pumps are available, although they might be less efficient.

Primary and backup power to the Well #1 pump house is served by a 100A, 208/120V circuit from the main distribution panel at Well #2. The well house has a 100A panelboard that powers the well pump, air stones, feed shed, alarm system, and ancillary lighting/receptacles. Backup power is provided (automatically transferred) to all loads from the generator located at Well #2. The electrical infrastructure is in adequate condition. In several cases, there is insufficient clear working space in front of electrical panels, per National Electric Code (NEC).

The pump is controlled by an on/off combination starter. An antenna is used to provide wireless communication of alarms/status to the main alarm panel in the Hatchery Building. There is no automatic or remote control of the pump.

Heating for Well # 1 is provided by a wall-mounted, propane fired heater which appears to be in fair condition and should be replaced soon.

**Figure 4-1: Well/Pump House #1 and Spring Reservoir**

## 4.2 Well #2

Water from Well #2 (shown in Figure 4-2) arrives at Pump 1 Reservoir in mostly buried, mostly white 6-inch PVC pipe. In May of 2022 the well pump was a temporary submersible turbine. Historically the pump was a line-shaft turbine. The pump has a low water cut-off set at 40-feet and experiences 18-feet of drawdown. Years ago, the well and pump flowed 200-240 gpm; but flow has declined to 150 gpm. The submersible turbine pump has an above-ground discharge that goes through a gate valve and then turns underground.

Well #2 experienced a pump and motor failure in 2022. Currently, staff are borrowing a pump and motor to maintain operation. It is recommended by the well company that this well be abandoned due to a corroded screen and failing well capacity. A new well is estimated to cost $125k.

**Figure 4-2: Well/Pump House #2 and Generator**

Primary power to Well #2 pump house is provided from a new 112kVA, 208V utility pad-mount transformer, see Figure 4-3. Primary power to the transformer is routed underground from a nearby distribution line. Power is routed underground from the transformer to the meter located on the well house. A 208V panelboard in the well house provides power to Well #1, #2, and #3, as well as the monitoring/alarm system and ancillary lighting/receptacles.

The pump is controlled by an on/off combination starter. An antenna is used to provide wireless communication of alarms/status to the main alarm panel in the Hatchery Building. There is no automatic or remote control of the pump.

A new (2020) 25kW standby propane generator is located near Well #2 to provide backup power to all three well houses, shown in Figure 4-4. The generator has an automatic transfer switch, and three circular propane tanks for fuel. The well house contains an abandoned indoor generator.


**Figure 4-3: Transformer and Foundation at Well/Pump House #2**


**Figure 4-4: New 25kW Standby Propane Generator**

The electrical infrastructure is in adequate condition. In several cases, there is insufficient clear working space in front of electrical panels (per NEC). There is an old, abandoned 25kW Olympian generator located inside the well house. It is recommended this generator be removed, along with associated devices and conduit/wiring, in order to facilitate working space and clarify the operation of the facility. Heating for Well Pump # 2 is provided by wall mounted heaters, which appear to be in fair condition and should be replaced soon.

## 4.3 Pump 1 Reservoir

Pump 1 Reservoir contains aeration diffusers connected to PVC distribution piping and two 0.6 Hp regenerative blowers in the house over Well #1. Sediment and vegetation growth has reduced the total capacity of Pump 1 Reservoir and sediment removal is recommended. Pump 1 Reservoir spills directly into the northmost pond of Block 1 (Upper Reservoir Pond) through a bar screen. The flow is serially reused in the six other ponds of Block 1. In addition, a gravity pipeline runs from Pump 1 Reservoir to the Former Public Relations Pond (Block 4), the Show Ponds (Block 5), and the Hatchery Building (Block 6).

The low head dam that impounds the water of Pump 1 Reservoir has an opening with weir boards and bar screens (Figure 4-5). Here water enters the Upper Reservoir Pond. The concrete of this structure is fair to good, with surface cracking and efflorescence and some vegetation growth on exposed surfaces. Other than routine cleaning, no maintenance actions are currently necessary.

**Figure 4-5: Pump 1 Reservoir Dam**

## 4.4 Well #3

Well #3 was redeveloped in 2012 by Layne Christensen Well Company, now retired. Well #3 has a 5 HP submersible turbine pump. It flows artesian at 200-350 gpm when not pumped, and 500 gpm when pumped. This well is approximately 32 feet deep. This well will be redeveloped again in June 2023 by Barrie Miller Well Company.

Primary and backup power to the Well #3 pump house (Figure 4-6) is served by a 60A, 208/120V circuit from the main distribution panel at Well #2. The well house has a 60A panelboard that powers the well pump, alarm system, as well as ancillary lighting/receptacles. Backup power is provided (automatically transferred) to all loads from the generator located at Well #2. The electrical infrastructure is in adequate condition. In several cases, there is insufficient clear working space in front of electrical panels (per NEC).

**Figure 4-6: Well/Pump House #3**

The pump is controlled by an on/off combination starter. An antenna is used to provide wireless communication of alarms/status to the main alarm panel in the Hatchery building. There is no automatic or remote control of the pump. Heating for Well Pump #3 is provided by wall mounted heaters which appear to be in fair condition and should be replaced soon.

## 4.5 Pump 3 Reservoir & Spring Reservoir

Submerged in Pump 3 Reservoir are approximately thirty natural springs (artesian flowing well points), the locations of which only six to eight are known. Flows from Well #3 and the Natural Springs are impounded in Pump 3 Reservoir by Pump 3 Reservoir Dam. A screened intake box above Pump 3 Reservoir Dam protects a pipeline which transports water to Pump 1 Reservoir. Water not conveyed to Pump 1 Reservoir spills over the weir boards of Pump 3 Reservoir Dam into

Spring Reservoir. Another tiny dam impounds the water in Spring Reservoir which overflows into Patch Brook.

A cylindrical intake screen in the south end of Spring Reservoir carries water in buried 6-inch blue-green PVC pipe (Figure 4-7) to either Spring Pond (the uppermost pond of Block 2) or the Lower Reservoir Pond (the third pond of Block 1).

**Figure 4-7: Cylindrical intake screen in Spring Reservoir**

The southmost three ponds are Block 3. They flow serially and get serial flow from Pond 8 of Block 2. Block 2 ponds drain into the central drain system.

A concrete control structure/dam impounds water in Pump 3 Reservoir (Figure 4-8) that is collected from the Main Springs Area as well as Well #3. Impoundment height is controlled with weir boards. Riprap has been recently added downstream of the impoundment (Figure 4-9). Impounded water depth is 2-3 feet. The concrete of this control structure is in fair to good condition, with minor surface cracking and some vegetation growth on exposed surfaces. There is no recommended maintenance at this structure at this time.

A screen box near the middle of the springs area protects a pipe inlet with bar screen (Figure 4-10). The pipe conveys water from Pump 3 Reservoir to Pump 1 Reservoir approximately 3,500 feet south. The structural condition of this screen box and inlet screen is fair to good. Other than routine cleaning of debris, no rehabilitation actions are necessary at this time.

**Figure 4-8: Impoundment/Dam of Pump 3 Reservoir**

**Figure 4-9: Dam/Impoundment of Pump 3 Reservoir (Screen Box in left background)**

**Figure 4-10: Screen Box in Pump 3 Reservoir**

## 4.6 Water Supply and Control Structures Summary

To summarize, the following limitations, deficiencies, and conditions are recommended for correction or rehabilitation for the water supply and control structures:

Well #1:

- Replace wall-mounted heater in well house.

Well #2:

- It is recommended the abandoned generator be removed, along with associated devices and conduit/wiring, in order to facilitate working space and clarify the operation of the facility.
- Replace wall-mounted heater in well house.
- Well records should be compiled first. Then the well should be inspected to confirm viability for development versus replacement

Pump 1 Reservoir:

- It is recommended that sediment removal and disposal be completed in the near term.

Well #3:

- Replace wall-mounted heater in well house.
- It is recommended that Well #3 be evaluated and reconditioned.

# 5 Incubation and Rearing Facilities

Incubation and early rearing occur in the Hatch House while intermediate and late rearing occur in thirteen (13) outdoor concrete ponds, grouped as Blocks 1-5 which include the following ponds: Upper Reservoir, Middle Reservoir, Lower Reservoir, Above Bridge Pond, Bridge Pond, Below Bridge Pond, Pond No. 8, Spring Pond, Round Pond, Long Pond, First Little Pond, Second Little Pond, Rainbow Pond. Warren also operates and maintains two show pools and a former public relations pond. The ponds operate under serial reuse. The linear units have flow rates that average 325 gpm but can vary from 250 to 500 gpm. Some of the ponds had separate wastewater drains that were consolidated to a single outfall to control solids release. Automatic fish feeders are not used in the ponds. Mechanical aerators are sometimes used to supplement dissolved oxygen. Each of these facilities and their conditions are described in the sections that follow.

## 5.1 Hatch House

The Hatch House consists of the original hatchery building (Figure 5-1), which was constructed in 1915, along with an addition that was constructed on the back (east) façade to create an office space and additional linear tanks (Figure 5-2 and Figure 5-3). The exact date of the addition is unknown. This building is believed to be historically registered.

The Hatch House contains four (4) rooms on the ground floor, plus an attic space over the main area of the original hatchery building. There is a visitor’s area at the front of the Hatch House that houses displays and provides viewing into the main tank room of the original hatchery building, which is currently used primarily for incubation (Figure 5-4).

The rear addition consists of a rear tank room and an office space. The rear tank room houses 2 sets of linear tanks for young rearing (Figure 5-5). The office space and rear tank room were not currently being utilized at the time of the site visit due to issues with mold in those spaces.


**Figure 5-1: Hatch House Front (West) Facade**

**Figure 5-2: Hatch House North Facade**

**Figure 5-3: Hatch House Rear Facade**

## 5.1.1 Process

The Hatch House was used for incubation and early rearing of Atlantic salmon that were part of the federal program, Restoration of Atlantic Salmon to the Connecticut and Merrimack River Watersheds, that ended due to hurricane Irene in 2011. Since this time, some Brook trout incubating has been done within the hatch house. However, this hasn't been done since 2017. Two major issues are a concern with continued use of the existing Hatch House: 1) The temperature and quality of the source water, and 2) The Hatch House is flood prone.

The well water and spring water that provide for the source water at this hatchery is too cold for optimal trout incubation and early rearing. It is also high in dissolved nitrogen which is detrimental to the fish. There are round and linear early rearing tanks (indoor raceways) that have oxygenation/degas columns and a custom-made degasser (similar to a Swedish degasser) was applied to some early rearing tanks in the tank room.

Production water arrives at the building in 8-inch pipe. The original part of the Hatch House has 6-inch PVC supply piping with a rotating drumfilter and UV disinfection unit. The drumfilter is leaky and not used. The UV disinfection system is by Ideal Horizons and the nameplate is dated 1991. Ideal Horizons was bought by Aquafine decades ago and Aquafine later merged with Trojan. Although 3rd parties advertise Ideal Horizon parts, the lamp technology used in the year 1991 model is outdated.

The four raceways in the addition have screened standpipes and the ability to insert stoplogs mid-length and again at the end. Dimensions of these raceways are listed below. When they were in use, bottled oxygen was bought, and oxygen was distributed through metered tubing to oxygenation/degas columns at each raceway. A 4-inch schedule 40 PVC header carries their influent water.

Raceways 1-4:

- Construction material: Concrete
- Dimensions (operating depth): 30' L x 3' W x 3' D (1.5')
- Average (maximum) flow rates: 15 (50) gpm

The original tank room has dozens of 8-tray stack incubators installed low in old paired concrete raceways with parts of their walls cut away. One paired raceway remains uncut. Details on these incubators are as follows:

- Number: 80
- Construction material: Plastic trays in plastic slots in aluminum frames
- Dimensions (operating depth): N/A
- Average (maximum) flow rates: 150 gpm (50 @ 3 gpm each)

Raceway 5:

- Construction material: Concrete
- Dimensions (operating depth): 25’ L x 3’ W x 3’ D (1.5’)
- Average (maximum) flow rates: 15 (50) gpm

The tank room also has four, 6-foot-diameter round tanks on stands approximately 2-feet tall. Three of the round tanks are polyethylene and one is fiberglass reinforced plastic. Effluent from the incubators, round tanks and tank room raceways goes out the raceway drains that backup when Patch Brook backs up. Trench drains in the tank room floor also back up when Patch Brook backs up.

**Figure 5-4: Main Floor of Hatch House**

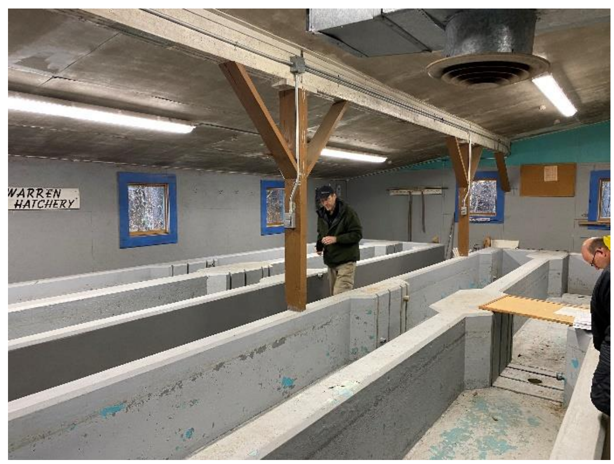



**Figure 5-5: Linear Tanks in Rear Addition**

## 5.1.2 Structural

The original Hatchery Building section construction consists of a concrete knee wall foundation supporting multi-wythe solid brick exterior walls and timber framed roof and attic (Figure 5-6 to Figure 5-8). The ground floor is a concrete slab-on-grade floor. The attic floor is supported by a series of round steel columns holding up a central timber beam. The structural elements are in good condition.

The rear addition is constructed of a concrete slab and curb foundation with wood framed walls and roof. The roof structure has two timber beams that are supported by wood columns with diagonal braces and diagonal braces at the walls. The wall of the office space is aligned with the beam and columns closest to the original building. The columns under the other beam sit on one of the concrete walls of the linear tanks. The structure of the rear addition appears to be in good condition (Figure 5-9 to Figure 5-11).

In the rear addition, there are two sets of concrete linear tanks. The tanks were not in use at the time of the site visit, and the concrete appears to be in good condition, with only superficial surface cracking. No maintenance of the rear addition tanks is currently necessary.

**Figure 5-6: Interior of Annex/Public Viewing Area**

**Figure 5-7: Hatch House Building Attic Area**

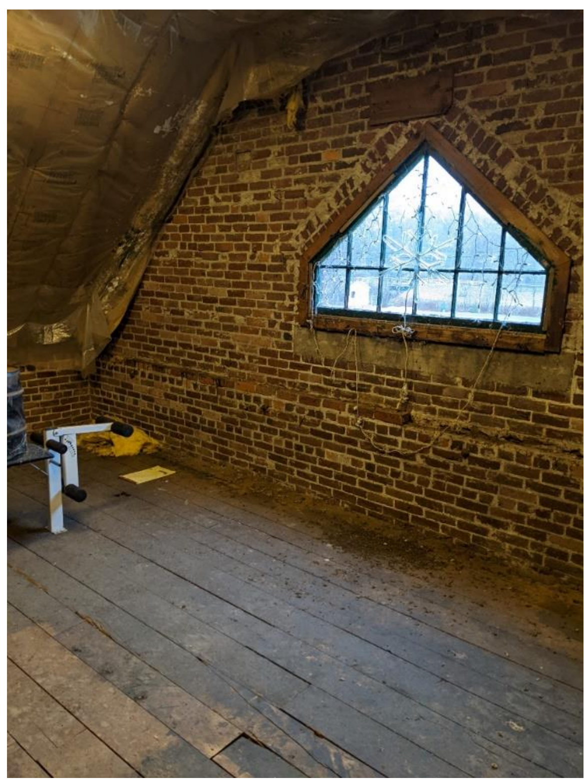


**Figure 5-8: Hatch House Attic Above the Annex Area**

**Figure 5-9: Hatch House Production/Incubation Area**

**Figure 5-10: Hatch House Office Area in Addition at Back**

**Figure 5-11: Hatch House Interior Raceways in Addition at Back**

### 5.1.3 Architectural

*Roof*

The roof of the original hatchery building is a hip and valley roof with asphalt shingles and metal edging. The age of the roof is unknown, but the shingles appeared to be in good condition, other than a few loose shingles. The roof over the rear addition is a shed style metal roof that slopes away from the original building. The metal roof appears to be in good condition. No leaks were reported by the staff, and no evidence of leaks were visually observed.

Fiberglass insulation has been installed between the roof rafters in the attic over the original building. In the rear addition, roof insulation was not visible due to the ceiling finishes.

*Exterior Walls*

The exterior walls of the original hatchery consist of concrete knee walls and solid multi-wythe common bond brick upper section. The walls appear to be in good condition. However, since these walls are solid concrete and masonry, they are not insulated.

The exterior walls of the rear addition are wood framed with vinyl siding. The vinyl siding appears to be in fair to good condition. There is evidence of minor green mold growth on the south and east faces, and the vinyl siding is in contact with grade on the north and south facades. The extent or condition of any insulation in these walls is unknown.

*Windows*

The exterior windows at the original hatchery building appear to be the original wood frame double-hung, single pane windows, with aluminum storm windows on the exterior. The windows appear to be in fair condition and are still operable.

The windows at the rear addition are wood frame fixed window. The windows appear to be in good condition, however the fact that they are not operable does not aid in air circulation in the addition.

*Doors*

The front door, which provides access to the visitor's area is a solid wood door with glass vision panels, a glass side light, and a glass transom. The door is operable and in fair condition, however the door is not insulated, the glass panels are single pane glass, the door does not fit squarely into the frame, the weather seal is missing most of the rubber gasket, and the exterior paint is peeling. The concrete sill has some minor cracking. There is a concrete slab landing in front of the door, which is also cracked. There is no accessible route from the parking area to the front door (Figure 5-12 and Figure 5-13).


**Figure 5-12: Front door from interior**

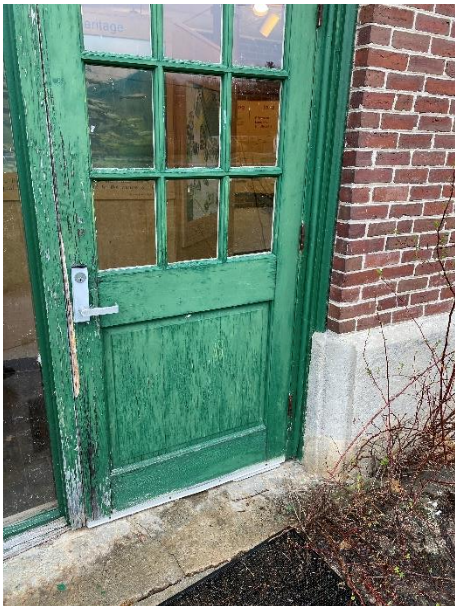


**Figure 5-13: Front Door from exterior**

At the north side of the original hatchery building, there is a double door that provides access between the main tank room and a loading dock. This door is used for loading only and is not used for access. The door is operable and appears to be in good condition, other than the fact that the door is not insulated and does not create a tight seal, especially at the bottom of the door. This door locks from the outside only via a latch and padlock (Figure 5-14 and Figure 5-15).

**Figure 5-14: Side Loading Dock Door**

**Figure 5-15: Loading Dock Door from Inside**

At the rear addition, there is a single 30-inch wide man door on the north façade that provides access into the rear tank room from the exterior. This door is a composite wood door with a vision panel and an aluminum threshold on a concrete sill. The door is operable and appears to be in good condition. The aluminum threshold does not appear to be sized correctly for the door, as it stops in front of the door, and a piece of wood has been placed behind the threshold to close off the underside of the door. The door sill is approximately 7-inches above the interior floor level of the rear addition, and there is a wood step inside the door (Figure 5-16 and Figure 5-17).

**Figure 5-16: Rear Addition Door Interior**

**Figure 5-17: Rear Addition Door Exterior**

### *Interior Spaces*

The visitor's area is located at the front of the Hatch House and is intended to be used as a public space for information and education displays, (Figure 5-18) as well as a viewing outlook into the main hatchery floor (Figure 5-19). Currently this area is closed, due to accessibility issues noted earlier. This space is accessed through the front door on the west side of the building. The interior finishes consist of a composite wood floor, exposed brick walls on painted concrete knee walls, and acoustic drop ceiling. This room appears to be in good condition with no major deficiencies, other than the doors and windows noted previously.

**Figure 5-18: Visitor's Area Display Area**

**Figure 5-19: Visitor's Area View Area**

The main tank room, which is currently used primarily for incubation, consists of old linear tanks that have been modified to support stacks of incubation trays and (4) raised circular tanks on wood platforms. There is a raised wood walkway along the east wall that is approximate 50-inches above the floor (see Figure 5-20), which is approximately 20-inches to 24-inches below grade. The walkway provides access through a doorway in the east wall into the office space as well as access to the loading dock.

There are two sets of wood stairs between the walkway and the main floor of the main tank room; one in the middle of the room aligned with the door to the office, and another at the north side of the room at the loading dock door. The walkway does not have any fall protection, and there are no handrails or guardrails on the stairs adjacent to the loading dock doors. The center stairs do have a wood handrail, but it is not code or OSHA compliant (see Figure 5-21).

The floors are painted concrete and the ceiling is asbestos paneling. Both appear to be in good condition. There is a wood staircase in the southwest corner of the room that provides access up to the attic space above the tank room (see Figure 5-22).

Access to the main tank room is either through the office space in the rear addition or via the loading dock. Since the loading dock doors can be locked from the outside and do not have panic hardware, the only means of egress from this space is through the office and rear tank room. This means of egress is not code compliant, or OSHA compliant.

Figure 5-20: Tank Room view from walkway

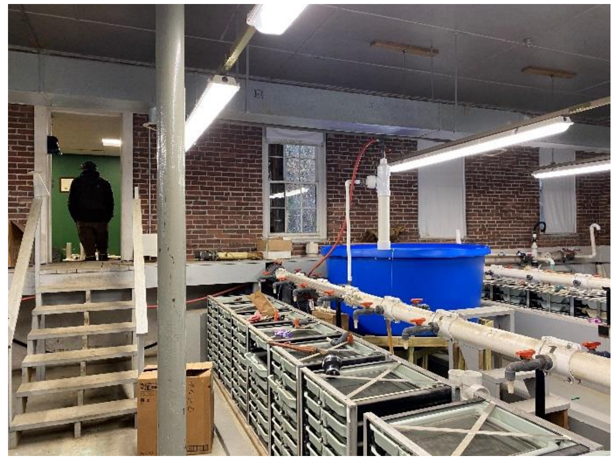


Figure 5-21: Tank Room view of main stairs

The attic space above the main tank room is used for miscellaneous storage, but was mostly empty at the time of the site visit (see Figure 5-23). The attic space consists of wood plank flooring, exposed brick exterior walls, and exposed roof rafters with fiberglass insulation. There are two smaller spaces that are separated from the main area of the attic by wood framed walls. The attic space appeared to be fairly clean and well maintained for an underutilized storage space.


Figure 5-22: Access stairs to attic

Figure 5-23: Attic Space

The Office Space in the rear addition is approximately 12-feet by 23-feet. This space is located between the main tank room and the rear tank room, with door access to both rooms. The doorway between the office and the main tank room does not have a door, and the window has been removed from the window opening between the two spaces to allow for pipe access, so there is no actual separation between the office and main tank room. The office consists of a raised plywood floor (that is approximately 7-inches above the rear tank room floor), a suspended acoustic ceiling, asbestos paneling walls over wood framing, and exposed brick and concrete walls. The floor, ceiling and panel walls appear to be in fair condition (Figure 5-24 and Figure 5-25).

Access from the office to the main tank room is through a doorway that is approximately 30-inches above the office floor. A set of wood stairs connects the doorway and office floor. The stairs are non-code compliant with varying riser heights at each riser and no handrails. The office space was not being used at the time of the site visit due to issues with a lack of ventilation and mold.

**Figure 5-24: Office Space & Stairs to Main Tank Room**

**Figure 5-25: Office Space window opening to main tank room**

The rear tank room consists of a 37-feet by 24-feet space with two sets of linear tanks, and a 12-feet by 12-feet area between the office and the entry door that houses mechanical and electrical equipment for the entire hatch house (Figure 5-26 and Figure 5-27). This space was not in use at the time of the visit due to issues with lack of ventilation / air circulation and mold. Both of the linear tanks were empty. The floor is an unfinished concrete floor. The walls and ceiling are asbestos paneling on wood framing. The floor, walls, and ceiling appear to be in fair to good condition.

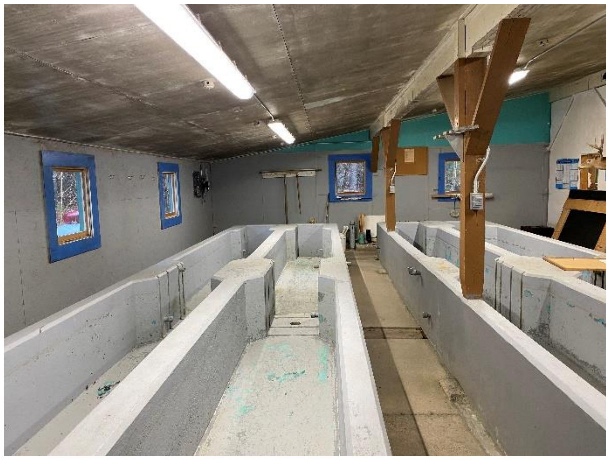


**Figure 5-26: Rear Tank Room Empty Linear Tanks**

**Figure 5-27: Rear Tank Room Mechanical / Electrical Space**

## 5.1.4 HVAC & Plumbing

Heating is provided by an oil-fired 117,000 British Thermal Units (BTUs) per hour (MBH) furnace located behind the tank room. Ventilation is provided by a wall mounted exhaust fan in the tank room. There is also a ceiling paddle fan. There is no air conditioning in the building. HVAC equipment appears to be in good condition but is assumed to be at the end of service life. No domestic plumbing is within the building.

## 5.1.5 Electrical

Electricity to the Hatchery Building is provided at 240/120V, single-phase. The service comes in overhead from the utility distribution line running along Fish Hatchery Road. The building service entrance/electric meter is on the North side of the facility. A 225A panelboard (200A MCB) distributes power to hatchery loads as well as out to the Garage and the Visitor's Center.

Hatchery facility loads include lighting, receptacles, UV disinfection system, a hot water heater, furnace, and a well pump. There are no spare breakers in the panelboard for the connection of future loads. At least one of the breakers is noted as being in disrepair. In general, electrical conduit/wiring appears to be in adequate working condition.

Backup power is provided by a 12kW standby propane generator located at the back end of the building. The generator powers an emergency load panel that powers select lighting in the hatchery space and office, the furnace, the UV system, the rotating drum filter, and the alarm system. All critical loads are covered by the generator according to hatchery staff. The generator is 21 years old and is near the end of its useful service life. Replacement should be considered in the near future.

Lighting in the hatchery space is provided by surface-mounted, gasketed LED strip-light fixtures. Lighting in the administrative space is recessed LED fixtures. Light levels appear adequate. Emergency lighting is provided by "bug eye" wall-packs with battery backup. Exit signs are in place. Lighting equipment is in good condition, and light levels are sufficient.

The facility does not have an instrumentation/control system for the hatchery process. There is a security system as well.

### 5.1.6 Hatch House Discussion and Recommendation

Given the extent of disrepair, mold, flooding issues, and poor water quality it is recommended that this Hatch House either be abandoned entirely or investigated for renovations to flood proof the interior portions of the building and renovate to serve the facility in alternative ways such as a dedicated visitor center, storage building, or office space.

This means that incubation and early rearing will no longer be a function of this facility, and fingerlings will need to be delivered to the facility for intermediate and final grow out. NHFGD can continue to use this building as is until disrepair makes it infeasible for continued use. However, HDR does not recommend investing in this structure for continued use due to its condition and tendency to flood.

## 5.2 Block 1 Ponds

Block 1 is composed of seven ponds: Upper Reservoir, Middle Reservoir, Lower Reservoir, Above Bridge, Bridge, Below Bridge, and No. 8. The dimensions of these ponds are listed in Table 5-1.

**Table 5-1: Block 1 Pond Dimensions**

| Name | Length (ft) | Width (ft) | Depth (ft) | Volume (ft$^3$) |
|---|---|---|---|---|
| Upper Reservoir | 72 | 38 | 2 | 5,472 |
| Middle Reservoir | 62 | 30 | 1.25 | 2,325 |
| Lower Reservoir | 86 | 23 | 2.67 | 5,280 |
| Above Bridge | 58 | 18 | 2.67 | 2,787 |
| Bridge | 53 | 21 | 2 | 2,226 |
| Below Bridge | 48 | 22 | 2 | 2,112 |
| No. 8 | 92 | 16 | 2 | 2,944 |

Pump 1 Reservoir overflows into the uppermost pond of Block 1. Water from Spring reservoir can also be diverted into Lower Reservoir Pond which is the third pond in Block 1. Only Middle Reservoir Pond, Lower Reservoir Pond and Pond #8 have drains. Serial flow between ponds occurs in a short concrete channel approximately 3-feet wide with weir boards and screens approximately 3-feet apart which serves a small quiescent zone for suspended waste to settle. These settling zones are routinely vacuumed with a trailer mounted pump and 500-gallon tank and then land applied, except in winter when the tank is emptied into one of the clarifiers and less frequent cleaning is needed.

### 5.2.1 Structural

The ponds are typically hexagonal or octagonal in shape, with sloped concrete walls. They were originally earthen-bottomed but many of the ponds used for production had concrete-poured bottoms installed around 2010 in order to reduce inflow/outflow interaction with groundwater. The dimensions of the ponds match the original earthen ponds, and the walls are angular at corners, with the typical pond narrower at the inlet and outlet. The pond wall concrete is in fair condition, with vertical cracks at most of the angles/corner of the walls, localized spalling at the top of the walls and some significant deterioration at the concrete of the inlet/outlet control structures between ponds, some of which has been previously repaired. If leakage of water is excessive at the ponds, sealing the cracks with epoxy mortar would reduce loss of water due to leakage. The water level at the shallow ponds is typically kept near the top of the walls, which acts to reduce deterioration due to temperature changes and weathering (Figure 5-28 to Figure 5-32).

**Figure 5-28: Walls at Upper Reservoir Pond**

**Figure 5-29: Predator Protection Structures at Middle Reservoir Pond**

**Figure 5-30: Typical Pond Wall Cracking at Angles/Corners**

**Figure 5-31: Previously Repaired Wall at Inlet to Middle Reservoir Pond**

**Figure 5-32: Bridge Pond Raceway and Timber Bridge**

## 5.3 Block 2 Ponds

Block 2 is composed of three ponds: Spring Pond, Round Pond, and Long Pond (Figure 5-33 to Figure 5-35). The dimensions of these ponds are listed in Table 5-2.

**Table 5-2: Block 2 Pond Dimensions**

| Name | Length (ft) | Width (ft) | Depth (ft) | Volume ($ft^3$) |
|---|---|---|---|---|
| Spring Pond | 55 | 20 | 2.33 | 2,563 |
| Round Pond | 59 | 23 | 1.67 | 2,226 |
| Long Pond | 96 | 15 | 1.67 | 2,565 |

According to the drawings, only Spring Reservoir water comes to these three ponds (Figure 5-33). It enters at Spring Pond and flow is serial thereafter. These ponds have settling zones similar to the Block 1 ponds. At the time of the on-site condition assessment In May of 2022 these were the only ponds with an aeration system like the one at Pump 1 Reservoir.

The concrete condition of the Block 2 ponds is similar to the Block 1 ponds, with cracking and efflorescence at most angles/corners of the pond walls and localized significant spalling/deterioration at the inlets/outlets/control structures between the ponds (Figure 5-34). Repair recommendations include sealing cracks with epoxy mortar to reduce leakage and localized concrete repair of spalling only where control structures like stoplogs or weirs are affected.

Other potential improvements include enlargement of the quiescent zones, upgrading the predator deterrence netting, upgrading the aeration piping or replacing the blower-based aeration system with a bulk oxygen-based oxygenation system.

**Figure 5-33: Inlet Area of Spring Pond**

**Figure 5-34: Concrete Deterioration at Block 2 Ponds**

**Figure 5-35: Round Pond**

## 5.4 Block 3 Ponds

Block 3 is composed of three ponds: First Little, Second Little, and Rainbow. The dimensions of these ponds are listed in Table 5-3.

**Table 5-3: Block 3 Pond Dimensions**

| Name | Length (ft) | Width (ft) | Depth (ft) | Volume ($ft^3$) |
|---|---|---|---|---|
| First Little | 50 | 14 | 2 | 1,400 |
| Second Little | 46 | 13 | 2.33 | 1,393 |
| Rainbow | 84 | 20 | 1.5 | 2,520 |

These three ponds receive serial reuse water from the Block 1 and Block 2 ponds then also flow serially and have small settling zones like the other ponds. First Little Pond has a drain and Rainbow Pond overflows into a drain.

The concrete condition of the Block 3 ponds is similar to the Block 1 ponds, with cracking and efflorescence at most angles/corners of the pond walls and localized significant spalling/deterioration at the inlets/outlets/control structures between the ponds. Repair recommendations include sealing cracks with epoxy mortar to reduce leakage and local repair of spalling/deterioration at control structures.

Other potential improvements include enlargement of the quiescent zones, upgrading the predator deterrence netting, and addition of a blower-based aeration system or a bulk oxygen-based oxygenation system.

## 5.5 Show Ponds and PR Pond

Warren also maintains and operates Big Show Pond and Little Show Pond (Block 5) that are separate from the other production ponds. They are used for display only and not used for production. The display/show ponds are located near the Hatchery Building. Additionally, Warren also maintains and operates the PR (Public Relations) Pond, which has been used for a variety of functions including public fishing derbies, Atlantic Salmon Brood, and currently is being used for Bridle Shiners (Figure 5-36 and Figure 5-37).

Big Show Pond has a 3-inch exposed supply gate valve and this pond’s water flows serially to Little Show Pond. Hatchery personnel report that the units typically receive a flow rate of 35 gpm from the main hatchery building water supply line. The PR Pond receives first use water from Pump #1 Reservoir. When used previously for Atlantic Salmon broodstock, the PR Pond utilized three short power poles to power floating motor aerators; but the pond had no aeration in May of 2022. The pond would probably benefit from aeration, whether it be reapplication of floating motor aerators or other aeration such as pond bottom diffusers connected to on-shore blowers. As a production pond or broodstock pond, the pond would also probably benefit from dredging and bank tree removal and removal of brush and other vegetation. Steps could be added to aid in harvest. The pond bottom could even be reshaped and lined and it could be covered with netting, primarily to deter predation by birds. If the pond is ever to be used for public fishing again, then leaving it in a more natural state would be prudent (Figure 5-38 and Figure 5-39).

The concrete condition of the Big Show Pond is similar to the Block 1 ponds, with cracking and efflorescence at most angles/corners of the pond walls. Repair to the cracked areas of the Big Show Pond walls is needed if it is to remain in use for an extended period of time.

The structural condition of the headwall and outlet box at the PR (Public Relations) Pond is fair, with moderate cracking and spalling and efflorescence. The outlet box concrete should be rehabilitated to repair spalling as part of routine maintenance. The headwall concrete should also be scheduled for routine maintenance and patching of spalls, etc.

**Figure 5-36: Impoundment/Outlet Box at PR Pond**

**Figure 5-37: PR Pond (Earthen)**

**Figure 5-38: Viewing Deck at Big Show Pond** **Figure 5-39: Typical Wall Cracking at Show Pond**

# 5.6 Outfall

In 2010 all of the facilities process drains were consolidated with a network of manholes and buried PVC pipe beginning as 12-inch diameter. Now there is one outfall instead of several. The outfall is a 20-inch standpipe that spouts out after a concrete headwall leading to Patch Brook. The standpipe assures that the arriving effluent main stays full. A transit time water flow meter and automatic sampler are included in a lighted and heated shed. The standpipe is fitted with a knife gate that can be opened for pipeline maintenance. The outfall is enclosed by chain link fence and is southwest of the main hatchery building next to Fish Hatchery Road.

# 5.7 Solids Storage

The drain consolidation project included the addition of two rectangular clarifiers in the middle of the facility. In winter when settled solids vacuumed from ponds cannot be land applied, they are dumped from a trailer mounted tank into either clarifier. Three to six 600-gallon loads are dumped into each clarifier every 2-4 weeks during winter. Each clarifier has an overflow weir leading to 8-inch PVC drain to the consolidated drain system. Each clarifier also has a 3-inch decant hose and 1-1/2-inch PVC ball-valved spring water supply pipe (Figure 5-40).

**Figure 5-40: Storage Shed in Center, Clarifiers in Background, Below Bridge Pond in Foreground.**

## 5.8 Incubation and Rearing Facilities Summary

To summarize, the following limitations, deficiencies, and conditions are recommended for correction or rehabilitation for the incubation and rearing facilities:

Hatch House:

- It is recommended that this Hatch House either be abandoned entirely, or investigated for renovations to flood proof the interior portions of the building and renovate to serve the facility in alternative ways

Block 1 Ponds:

- It is recommended that cracks in the pond walls are sealed with epoxy mortar to reduce water leakage/loss and that localized concrete repairs are performed where spalling and deterioration is present at control structures (weirs, baffles, etc).

Block 2 Ponds:

- It is recommended that cracks in the pond walls are sealed with epoxy mortar to reduce water leakage/loss and that localized concrete repairs are performed where spalling and deterioration is present at control structures (weirs, baffles, etc).

Block 3 Ponds:

- It is recommended that cracks in the pond walls are sealed with epoxy mortar to reduce water leakage/loss and that localized concrete repairs are performed where spalling and deterioration is present at control structures (weirs, baffles, etc).
- Potential improvements include enlargement of the quiescent zones, upgrading the predator deterrence netting, and addition of a blower-based aeration system or a bulk oxygen-based oxygenation system.

Show Ponds and PR Pond:

- Repair cracks in the walls of Big Show Pond
- Replace or fix any loose handrailing or unsafe conditions for the Public around the Show Ponds and PR Pond.
- The PR Pond outlet box concrete should be rehabilitated to repair spalling as part of routine maintenance.
- The PR Pond headwall concrete should also be scheduled for routine maintenance and patching of spalls, etc.
- The pond would probably benefit from aeration, whether it be reapplication of floating motor aerators or other aeration such as pond bottom diffusers connected to on-shore blowers.
- As a production pond or broodstock pond, the pond would also probably benefit from dredging and bank tree removal and removal of brush and other vegetation.
- Steps could be added to aid in harvest. The pond bottom could even be reshaped and lined and it could be covered with netting, primarily to deter predation by birds.
- If the pond is ever to be used for public fishing again, then leaving it in a more natural state would be prudent.

# 6 Garages and Storage Areas

Warren State Fish Hatchery includes several support buildings that provide storage, shop, and garage spaces for the facility. These buildings are detailed and assessed for condition in the sections that follow.

## 6.1 Garage

The Garage is adjacent to the Visitor Center and Assistant Residence behind the Hatch House, see Figure 6-1. It is a 19-feet by 19-feet wood structure that is used for the storage of miscellaneous vehicles, equipment, and storage, consisting of two garage bays and a storage loft above the eastern bay. The structure consists of a concrete foundation and floor slab with timber framed walls, roof, and two wood columns that support a central wood beam for the storage loft. The wood framing appears to be in good condition, but the concrete slab was observed to have significant cracking, most notably along the column line in the middle of the garage (see Figure 6-2).

**Figure 6-1: Garage**

The roof is an asphalt shingle roof, and it appears to be in good condition other than a buildup of moss and pine needles on the eastern side of the roof that should be cleaned off to prevent future damage. The walls are constructed with wood siding exteriors and plywood or OBS panels on the interior and appear to be in good condition.

The east bay is accessible through a wood sliding barn style door, while the western bay has a double swinging door for access. Both doors are operable.

The garage is heated so that it can be used during the winter. Insulation has been installed between the roof rafters, and plastic sheeting has been laid out over the open west bay, to try to minimize heat loss, but the garage doors do not provide weathertight seals, and the walls are not believed to be insulated.

The garage functions adequately for storage and miscellaneous repair work as it is currently used. It is recommended that the cracks in the floor slab be monitored to make sure they do not continue to grow. Since this area is prone to flooding, it is possible that the soil beneath the floor slab is soft, which has caused the slab to settle.

Power to the garage is sub-fed underground from the Visitor's Center building panel. The building has receptacles and fluorescent lighting. The condition of electrical infrastructure appears adequate for the needs (see Figure 6-3).

**Figure 6-2: Cracked Floor and Plastic Sheeting**

**Figure 6-3: West Facade Electrical Connection and Propane Tanks**

## 6.2 Warehouse Building

The Warehouse Building (Figure 6-4) is an approximately 100-foot long by 28-foot wide building located along Fish Hatchery Road between the Hatch House and the Manager's Residence that houses a work shop, feed storage, maintenance garage, and miscellaneous storage. The exact age of the Warehouse is unknown, but it is believed to have been built in the 1960s.

The garage structure consists of concrete foundations that extend approximately 18-inch above grade, a concrete slab on grade first floor, and wood framed walls, roof, and attic floor. The structure appears to be in good condition.

The roof is a timber construction gable style roof with asphalt shingles. The age of the roof is unknown, but the roof appears to be in good condition, and no signs of leaking were observed. The roof is not insulated.

The exterior walls consist of wood plank sheathing with vinyl siding exterior finish. The exterior walls are not insulated. The vinyl siding appears to be in good condition other than a few locations with minor cracking or chips.

The windows are all the original wood framed awning style windows with single pane glass. These windows offer little insulation, and in the workshop area, plastic sheeting has been installed over the windows to help provide insulation, but that prevents the windows from being operable which mitigates their use for ventilation and air circulation. It is recommended that all windows be replaced with new insulated double pane glass windows with thermal breaks.

**Figure 6-4: Warehouse Building Front Facade**

The Warehouse Building has two single man doors and four overhead garage doors (see Figure 6-5). The man doors at the main entrance appears to have been replaced within the past few years with a newer insulated exterior door with insulated glass. The other man door to the garage bay appears to be the original door. The overhead doors appear to be in good to fair condition, however all of these doors appear to leave gaps around the door, especially at the bottom. It is recommended that any doors to spaces that are to be heated be replaced with insulated garage doors that provide a proper seal when closed.

The Warehouse Building is broken into four bays (garage bay, feed storage bay, entrance bay, and workshop bay) with a storage attic that runs above all four bays for the length of the building. The garage bay is located at the north end of the Warehouse Building and consists of two 36-foot by 14-foot bays that are accessed by overhead garage doors on the north façade of the building. The garage bay consists of a concrete floor slab with exposed studs and ceiling joists. This space is not insulated or heated. The south wall of this space is wood stud framing with asbestos panel finish (Figure 6-6).

**Figure 6-5: Garage Bay Overhead Doors**

**Figure 6-6: Garage Bay Rear Wall**

The feed storage bay is located between the garage bay and entrance bay and is approximately 24-feet-wide. The bay is accessed directly from the exterior via an overhead garage door, or from the garage or entrance bay via man doors. The front section of the bay is a seven-feet-deep open area with level slab, while the rear 18-foot section of the of the bay was previous used for cold storage with cork insulated floor, walls and ceilings. The door between the insulated and uninsulated sections of this bay has been removed and a wood ramp has been placed at the opening to allow for easy movement of feed pallets and for storage of a tractor. Similar to other feed storage areas at other facilities, the feed storage area does not provide a means for temperature control, nor does it provide a secure area to protect the feed from rodents (see Figure 6-7 and Figure 6-8).

**Figure 6-7: Feed Storage Wood Ramp**

**Figure 6-8: Feed Storage Front Access**

The entrance bay is approximately 12-feet wide and serves as the main entrance into the Warehouse Building, miscellaneous storage, and access to the attic storage via a set of wood stairs. The stairs to the attic do not have any railings or handrails. The interior walls and ceiling are finished with asbestos panels. It is recommended that OSHA compliant railings and handrails be installed along the open edge of the stairs (see Figure 6-9 and Figure 6-10).

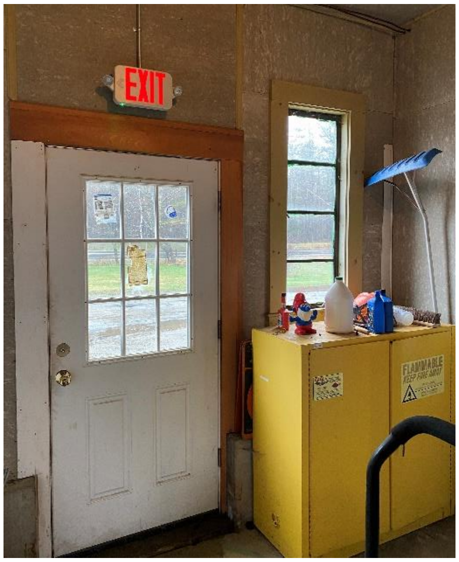



**Figure 6-9: Entrance Bay Main Entrance Door**

**Figure 6-10: Entrance Bay Storage and Stairs to Attic**

The workshop (24-feet by 28-feet) is the southernmost bay in the warehouse, and it is used for miscellaneous maintenance repairs on smaller equipment. This bay has direct access to the exterior via an overhead garage door or can be accessed from the entrance bay via a man door. This space has a concrete floor slab, wood panel interior finish on the walls, and open joist ceiling. Plastic sheeting has been fastened to the ceiling joists to provide some insulation from the attic space. The exterior walls are not believed to be insulated. Staff noted that this space is hard to keep warm during the winter and does not provide adequate ventilation when the windows are covered with plastic. It is recommended that this space be gutted to expose the studs and joists, and new insulation and wall and ceiling finishes be installed along with new insulated operable windows and insulated garage door (see Figure 6-11 and Figure 6-12).

**Figure 6-11: Workshop Bay**

**Figure 6-12: Workshop Overhead Door**

The attic space runs the length of the building above all four bays and is used for miscellaneous storage. The attic space consists of wood plank flooring with exposed roof rafters. The is no insulation in the attic. The attic is accessible from the entrance bay via a wood stair case and there is a wood access door in the floor. No evidence of water damage or leaking from the roof were observed (see Figure 6-13 and Figure 6-14).

**Figure 6-13: Attic Space Storage Area**

**Figure 6-14: Attic Space Access Doors**

There is no air conditioning or ventilation in the warehouse building. Heating is provided by an oil-fired furnace. A fuel storage tank is located next to the garage door. HVAC equipment appears to be in good condition but is assumed to be at the end of service life and should be replaced. There is no domestic plumbing in the building.

### 6.2.1 Electrical

Electricity to the Warehouse is provided at 240/120V, single-phase. The service comes in overhead from the utility distribution line running along Fish Hatchery Road. A 10kVA pole-top transformer powers the service entrance at the southwest corner of the building. The main service panel has a 200A main breaker, and then a 30A branch breaker to the facility loads. The 200A panel is over-sized for the facility service and loads.

Electrical panels within the building are a mixture of antiquated/obsolete Federal Pacific and ITE equipment. Much of the equipment is in disrepair, and hand labelled as broken. The equipment cannot be relied upon to operate in a safe manner.

Lighting is provided by old fluorescent and incandescent fixtures. Lighting in the administrative space is recessed LED fixtures. There is a new exit sign installed. Lighting equipment is in poor condition, and light levels are insufficient.

There is no backup power or instrumentation and control systems.

## 6.3 Storage Shed

The Storage Shed is a 16-feet by 30-feet wood structure used for material storage and Conservation Officer's boats in the winter. See Figure 6-15 and Figure 6-16. The shed is constructed of wood posts on individual concrete footings with wood framed roof structure. The walls consist of wood boards running between each post with plywood sheets as the exterior finish. The roof is a single slope shed style corrugated metal roof. There are two large openings on either side of the shed to allow for materials or boats access, and there is no flooring. There is no power, lighting or HVAC in this shed. Staff noted this shed is adequate for its intended use. The structure and finishes appear to be in good condition.

**Figure 6-15: Storage Shed Front View**

**Figure 6-16: Storage Shed Interior**

## 6.4 Feed Storage and Pole Shed

The Feed Storage and Pole Shed is a 16-feet by 40-feet storage building just north of Spring Pond that is used for feed storage and other miscellaneous storage for the northern ponds. See Figure 6-17 and Figure 6-18. This storage structure includes a fully enclosed section used for the feed storage with a three-sided covered storage area to the north. The enclosed area consists of a timber frame structure on a wood base set on concrete blocks on sonotube footings, while the covered storage area is comprised of a wood frame roof supported by wood posts sitting on individual concrete footings. At the southeast corner of the feed storage, there is a metal bracket to hold the wood base together and the base is shimmed up on top of the concrete blocks, which were observed to be deteriorated.

**Figure 6-17: Feed Storage and Pole Shed Front (West) Facade**

**Figure 6-18: Southeast Corner of Feed Storage and Pole Shed**

# 6.5 Visitor Center and Assistant Residence Building

The Visitor Center and Assistant Residence Building is a wood frame structure that houses a visitor's center, public restrooms, and mechanical room on the ground floor, and a residence on the upper level for the assistant. See Figure 6-19, Figure 6-20, and Figure 6-21. The visitor's center was closed several years ago by the fire marshal due to fire separation code issues between the visitor center and residence above. The upper level is currently being used as the office and staff break room due to ventilation and mold issues in the Hatch House office space. The assistant resides off-site.

The building is supported by a shallow concrete foundation and a concrete knee wall at the front. The ground level is a concrete slab-on-grade, and the second floor is a wood framed floor. The structure appears to be in good condition.

This building is located within the FEMA Flood Zone X, and staff noted that the lower level has flooded on several occasions with flood waters reaching approximately 6-inches.

Figure 6-19: Front Facade of Visitor Center and Residence

- Year constructed: Unknown
- Area (sf): 1092
- Rooms: 2
- Electric: 120/240V, 3PH, 4 Wire
- Lighting (emergency): Yes
- Heating: 2 electric heaters
- Ventilation adequate?: yes
- Air Conditioning: no
- Emergency Power: no
- Telephone: yes
- Fire Alarm: yes

**Figure 6-20: Visitor Center North Side Facade**

**Figure 6-21: Rear View & Exterior Stair Access to Upper Level**

### 6.5.1 Architectural

*Roof*

The roof is a clipped gable style roof with asphalt shingles and metal edges. The roof appears to be in fair condition, and no leaks were observed or reported. The age of the roof is not known, but it appears to be towards the end of its life span, and it is recommended to be replaced.

*Walls*

The exterior walls are wood framed walls with wood siding exterior finish. The level of insulation in the walls is unknown, but it is believed that there is insulation within the walls. The walls appear to be in good condition other than cosmetic paint peeling from the wood siding and trim (see Figure 6-19). It is recommended that the exterior be repainted, especially if this building will continue to serve as the visitor's center.

*Doors*

There are six exterior doors on this building. One to each of the public restrooms, a single door to the visitor center, a double door to the visitor center, a single door to the mechanical room, and a single door to the residence. All of the doors are insulated hollow metal doors, and have large vision panels in the upper half of the door except for the public restroom doors. There is also a storm door on the exterior of the upper level door. All of the doors are operable and appear to be in good condition, other than some rusting at the bottom of the doors and of the door hinges (see Figure 6-22 and Figure 6-23). It is recommended that any rusting at the bottom of the doors be removed and the doors be repainted, and all hinges and door sweeps be replaced with stainless steel hardware.

**Figure 6-22: Rusted bottom of door to Visitor Center**

**Figure 6-23: Rusted Hinges on Door to Mechanical Room**

*Windows*

All of the windows are original to the building and are either double hung or casement windows with double pane insulated glazing. The windows were observed to be operable and in good condition.

The exterior window trim was observed to have peeling paint, but no signs of rotting was observed. It is recommended that the window trim be repainted to prevent future damage.

*Interior Spaces*

The lower level of the building consists of the visitor center in the front half, with the mechanical room in the rear south section and separate men's and women's public bathrooms in the rear north section.

The visitor center consists of composite wood flooring, gypsum board walls and acoustic suspended ceiling tiles. The floor and walls appear to be in good condition. Although staff noted that this room has flooded occasionally, no signs of water damage were visible to the floor, walls or displays. The ceiling tiles were in good shape other than a few missing tiles and several with water staining, which appears to have been from a leaky pipe above the ceiling (see Figure 6-24 and Figure 6-25). Refer to the Public Visitation Information section above for information on the displays. The visitor center has been closed since it was shut down by the fire marshal a few years ago due to code issues related to the fire separation between the visitor center and the residence above. If this space is to continue to be used as a public space, a new fire rated ceiling / floor assembly will be required.


**Figure 6-24: Visitor Center Water Damaged Ceiling Tiles**


**Figure 6-25: Visitor Center Missing Ceiling Tiles**

The mechanical room is an L shaped room that is approximately 14-foot wide with depths that range from 11'-6" to 18'-0". It houses the mechanical, plumbing and electrical equipment for the building. The room consists of an unfinished concrete floor, gypsum board walls and suspended ceiling tiles. The walls have sections of gypsum board cut out (Figure 6-26), and the ceiling has some broken or missing ceiling tiles (Figure 6-27).

Figure 6-26: Mechanical Room cut outs in wall


**Figure 6-27: Mechanical Room missing and broken ceiling tiles**

The upper level is laid out as a residence for the assistant with two bedrooms, one bathroom, an open kitchen / living area, a closet and laundry area. Access to the upper level is via a set of wood stairs and deck on the rear of the building. There is a secondary egress via an external fire escape on the front of the building that can be accessed through one of the windows in the living area. Since this area is not currently being utilized as a residence, the staff are using it as their office due to the mold and ventilation issues in the office space in the Hatch House (see Figure 6-28 and Figure 6-29). The upper level consists of hardwood floors in the main areas, carpeting in the bedrooms, and tile in the bathroom. The walls are gypsum board, and the ceilings are gypsum board or plaster. All of the finishes appear to be in good condition. It is recommended that a new office area be provided so that this space can return to being used as a residence for when it is needed again.

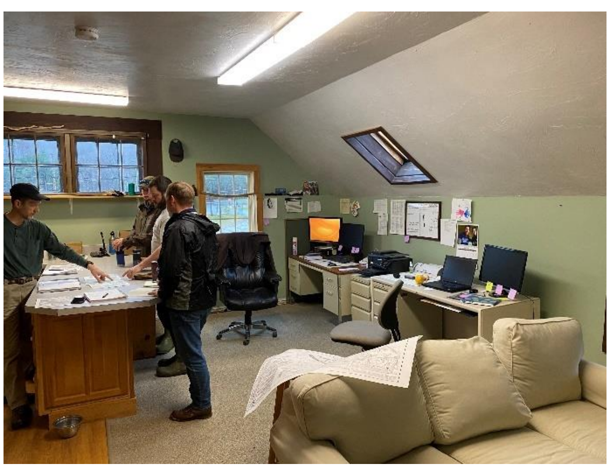


**Figure 6-28: Upper Level Office Space**

**Figure 6-29: Upper Level Break Area**

### 6.5.2 HVAC & Plumbing

No ventilation or air conditioning is provided. Heating is provided by a 129 MBH oil fired boiler (Figure 6-28) and radiator system. The boiler appears to be in fair condition with corrosion on the boiler housing. The boiler should be replaced. There is a water filtration system for the domestic water inside the building. The filtration system is in good condition and was installed in 2015.

### 6.5.3 Electrical

Electricity to the Visitor's Center is sub-fed from the Hatchery Building. The 100A, 240/120V single-phase circuit is routed underground to the main panel located in the southwest corner of the building. A 125A panelboard distributes power to building loads. Building loads include exhibit space lighting, receptacles, and heating, the upstairs office/residence space lighting/receptacles, the garage out-building, the well alarm system, as well as a sewage pump and water pump. The electrical infrastructure appears to be in adequate working condition.

There is no backup power for the facility. The alarm system may have a short-duration battery backup integral to the control panel.

Lighting in the exhibit space is provided by recessed fluorescent cans, as well as track-lighting for displays. Lighting in the office/residence is fluorescent ceiling lights. Light levels appear to be sufficient if all fixtures are operating correctly. There is emergency lighting and exit signs.

The office space has internet and telephone connectivity.

## 6.6 Garages and Storage Areas Summary

To summarize, the following limitations, deficiencies, and conditions are recommended for correction or rehabilitation for the garages and storage areas:

Garage:

- It is recommended that the cracks in the floor slab be monitored to make sure they do not continue to grow
- It is recommended that this garage be used in such a way that no significant damage would occur to the items inside should the building flood again.

Warehouse Building:

- It is recommended that all windows be replaced with new insulated double pane glass windows with thermal breaks.
- It is recommended that any doors to spaces that are to be heated be replaced with insulated garage doors that provide a proper seal when closed.
- It is recommended that OSHA compliant railings and handrails be installed along the open edge of the stairs.
- It is recommended that the workshop be gutted to expose the studs and joists, and new insulation and wall and ceiling finishes be installed along with new insulated operable windows and insulated garage door.
- HVAC equipment appears to be at the end of service life and should be replaced.

- The electrical system should be fully renovated including lighting.

Storage Shed:

- N/A

Feed Storage and Pole Shed

- N/A

Visitor Center and Assistant Residence Building:

- Replace roof.
- It is recommended that the exterior be repainted.
- It is recommended that any rusting at the bottom of the doors be removed and the doors be repainted, and all hinges and door sweeps be replaced with stainless steel hardware.
- It is recommended that the window trim be repainted to prevent future damage.
- It is recommended to keep this as an office on the second floor, while relocating the items in the visitor center to another facility for use. A second residence would then be required to be built on-site.